

**REMARKS**

Claims 1, 3-10, 16 and 17 are pending herein.

By this Preliminary Amendment, claims 1, 7, 9 and 10 have been amended, claims 11-15 have been canceled, and claims 16 and 17 have been added.

**I. Allowable Subject Matter**

Applicants note with appreciation that claims 7, 9 and 10 were objected to as being dependent on a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

To this end, the limitations of claims 1 and 5 are incorporated into claim 7, and the limitations of claim 1 are incorporated into claim 9. Thus, as acknowledged by the Patent Office, claims 7 and 9 are allowable. Further, claim 10 is amended to include limitations of claim 1 and is thus also believed to be allowable.

**II. Rejections Under 35 U.S.C. §102(b)**

Claims 1, 3-6 and 8 were rejected under 35 U.S.C. §102(b) as allegedly being anticipated by U.S. Patent No. 5,427,600 (hereinafter "Itoh"). This rejection is respectfully traversed.

Claims 3-6 and 8 each depend, directly or indirectly from claim 1.

Claim 1 recites a mechanical fuse comprising a driving portion to which rotating force is transmitted, a driven portion to which the rotating force is transmitted from the driving portion, and a rupture portion which transmits the rotating force from the driving portion to the driven portion and is broken when predetermined rotating force is loaded thereto. The rupture portion is composed of Fe-based sintered alloy, and the roundness of pores of the Fe-based sintered alloy is 0.004 or more so that the fatigue limit ratio determined by (fatigue strength)/(tensile strength) is 0.3 or more.

Since the mechanical fuse is required to be reliably broken when predetermined rotating force is loaded thereto, high fatigue limit ratio is indispensable. In order to obtain high fatigue limit ratio, the fatigue strength must be high and the tensile strength must be inhibited.

According to claim 1 of the present invention, the roundness of pores of the Fe-based sintered alloy is 0.004 or more, whereby notch sensitivity in the pores is dull and high fatigue strength is obtained while the tensile strength is not enhanced. As a result, the mechanical fuse has the fatigue limit ratio of 0.3 or more, thereby obtaining high reliability for a mechanical fuse.

In contrast, Itoh teaches a low alloy sintered steel suitable for gears and bearings, but does not teach application for a mechanical fuse. Accordingly, Itoh cannot anticipate the subject matter of claim 1.

Further, there is no motivation to apply the teachings of Itoh to a mechanical fuse comprising a driving portion to which rotating force is transmitted, a driven portion to which the rotating force is transmitted from the driving portion, and a rupture portion which transmits the rotating force from the driving portion to the driven portion and is broken when predetermined rotating force is loaded thereto, as recited in claim 1. In particular, the fatigue limit ratio is not relevant to products such as gears and bearings to which Itoh is applied.

Itoh simply does not anticipate, teach or suggest the specific features of the invention of claim 1 in which the roundness of pores of the Fe-based sintered alloy is 0.004 or more and the fatigue limit ratio is 0.3 or more.

The Patent Office asserts that the pores in Itoh have a somewhat circular cross section since the pores have a diameter on the order of microns or less. Applicants respectfully disagree.

In the present invention, the mechanical fuse is treated in steam to form an iron oxide layer in pore inner wall, thereby obtaining the roundness of pores of 0.004 or more as described in the examples of the invention. The iron oxide layer causes the round shape of the pore inner wall.

In contrast, such a special treatment is not performed in Itoh. Table 1 shows differences in the cases in which the steam treatment was performed and not performed. See Table 1, at col. 7 of Itoh. As shown in Table 1, roundness was 0.0033 when the steam treatment was not performed. The roundness was as large as the time for the steam treatment was long, and the tensile strength decreased. That is, the steam treatment of Itoh is performed to enhance the roundness to enhance the fatigue limit ratio at a sacrifice of the tensile strength. According to Table 1, the roundness in Itoh does not reach 0.004.

For the foregoing reasons, Applicants submit that Itoh fails to disclose the subject matter of claim 1 or any of the claims dependent therefrom. Accordingly, the invention of claim 1 is not anticipated by Itoh or rendered obvious by Itoh, alone or in combination with the other references of record.

Reconsideration and withdrawal of the rejection are thus respectfully requested.

### **III. Conclusion**

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1, 3-10, 16 and 17 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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